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Information Systems Research: Scientific Concepts, Language and Change in Evolving Problem Solving Activity

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INFORMATION SYSTEMS RESEARCH: SCIENTIFIC CONCEPTS, LANGUAGE AND CHANGE IN EVOLVING PROBLEM SOLVING ACTIVITY

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Abstract

There are several types of approaches to specify the contents and boundaries of the IS field, some of which are normative and some descriptive. However, they do not consider the role of scientific language change in problem solving. Research is an ever-continuing "intellectual voyage", in which both a research community and each individual researcher progress from one understanding to another during time. An essential part of the problem solving activity and its progress and thereby the progress of the field is evolution of language through problem solving. If a conceptual core for Information Systems is ever to be formed, it should at least make sense in regard to the progress of the IS field among its reference disciplines. Currently, such core cannot be identified due to the use of theoretically and linguistically isolated viewpoints to IS research. We need to strive to change our scientific language to convey and bridge gaps between different viewpoints and schools. In this, new conceptual innovations and active reinterpretation of used theories are needed. An inclusive view of the ontology of the field and willingness to actively pursue to evolve one's language, concepts, and conceptual viewpoints innovatively in research is essential for this.

Keywords: IS core ontology, paradigmatic orientation, conceptual viewpoint, scientific community, scientific language change, problem solving activity

1 INTRODUCTION

The conceptual foundation of the IS field has divided opinions among IS researchers since the early days of the discipline. The field seems to remain an unbridgeable gulf with many harbours. The "lack of unity" is often referred to as an identity crisis, due to a pressure to legitimate oneself in contrast to other academic departments. Some scholars suggest ontological frameworks (Ives, Hamilton & Davis 1980), nomological nets (Benbasat & Zmud 2002), consolidating frameworks (O'Donovan & Roode 2002), or state a need for a common paradigm (Weber 1987) to overcome this pressure. Some others seem not bothered by the situation and forward pluralism (Banville & Landry 1989, Avison & Nadhakumar 1995, Lyytinen & King 2004). Some search for an approach in the between (Davis 2000). Other attempts to clarify the foundation include empirical (Bacon & Fitzgerald 2001) and literature-based (Culnan 1987, Cushing 1990) studies. Also attempts to specify an IS curriculum, to create keyword classifications, and to identify schools, paradigmatic approaches, and theoretical perspectives in specific areas support this underlying objective.

The scholars seem to agree that there is a lack of unity but disagree on whether this lack of unity is beneficial or harmful for the field. The latest development in this discourse is the series of articles being published in *Communications of AIS* labelled as the "Debate on the Core of the Information Systems Field" since November 2003. The main points and arguments in the first phase of this debate are summarised by Alter (2003b). Here, I will take a different view on the problem: Why do we understand the core of the IS field so differently and yet are willing to relate ourselves to this particular field, even when we practically conduct research under no common name and identity? I do not believe it is merely because of common but differently understood terms, such as "information system" and how it is translated in different languages. Perhaps we are looking for a mistaken kind of unity. Perhaps our mistake is that we each attempt to define the "core ontology" to forward merely a viewpoint. Would it be possible to find unity that is capable of inclusion, instead of exclusion, of current research in the field?

I perceive research, metaphorically, as an ever-continuing "intellectual voyage", in which both a research community and each individual researcher progress from one understanding to another during time. What becomes the actual path is affected by the set target (such as "laws of nature", "regularities of behaviour", "better understanding"), accepted beliefs (such as theories, methods, and values) and the context in which the voyage begins and progresses (such as facilities of research, reality under observation, existing reference disciplines), and any changes that appear in these three. The "science wars", for which the IS field has been an ideal battleground in miniature, concern primarily the first of these with influence on the second. I am mainly concerned of the third – our segment of observed reality as it is narrowed down in contrast to existing and emerging reference disciplines.

I have two insights that guide my work. Firstly, I look for a theoretical setting that is more inclusive than exclusive in regard to current IS research yet without giving up a hope for generic unity in the field. To do this, I need to suggest an explanation of why the apparent diversity of IS research is not necessarily against the unity of the field. Secondly, I look for such a theoretical setting that makes sense in regard to the progress of the IS field among its reference disciplines. I need to suggest an explanation, or rather an interpretation, of what makes us classify ourselves as IS researchers despite our diverse backgrounds, educations, institutional contexts, personal preferences, and so on. In the light of all dispersion and diversity that the field abound, this seems like mere magic. Why do we *not* perceive ourselves as applied computer scientists, business researchers, and sociologists? Where are we implicitly heading for as a collective and why?

I argue for a theoretical setting that I find able to reach beyond the surface of the IS field. First, I shall classify different approaches that attempt to specify the conceptual limits of IS research (Section 2). Since these approaches are not strong in dealing with the role of scientific language change, I then discuss the evolution of language as the drive for problem solving activities (Section 3). Thereafter, I

shall narrow down a potential IS core context that I find not (too) biased to any specific viewpoint (in Section 4) and discuss the implications of this proposal for IS research (in Section 5). Finally, I shall make some short conclusions (in Section 6).

2 APPROACHES TO SPECIFY THE CONCEPTUAL LIMITS OF INFORMATION SYSTEMS RESEARCH

It is shown to be difficult for IS researchers to agree upon the conceptual foundation of the field. Different ways have been proposed to determine what are the concepts and theories that belong to the foundation and thereby to the potential subjects of study. Some of these approaches are normative: some researchers quest for narrowing down the conceptual foundation of the field, while some speak for allowing diversity. Some others strive to – if possible – somehow to identify and describe the conceptual foundation, on which the actual research and practice is currently conducted.

Normative approaches attempt to specify the conceptual limits of research by determining what kind of concepts and conceptual viewpoints should be included in (or excluded from) the conceptual foundation of the scientific field. The researchers have different objectives: to narrow down the conceptual foundation or to allow for a diversity of concepts and conceptual viewpoints in the field. The approaches have different standings towards how the subjects for IS research should be selected. There are at least two ways to classify these normative approaches: based on the assumed nature of the scientific field, or based on how the boundaries of the field are defined.

Based on the *assumed nature of the scientific field*, the approaches can be classified into at least three different classes (applied and elaborated from Davis (2000)). An *interdisciplinary field* evolves in the cross-section of various disciplines. It lacks a solid and coherent, commonly shared conceptual foundation, since it continuously borrows concepts and theories from the reference disciplines. The field strives for conceptual diversity, since diversity is seen as the engine for better understanding of diverse phenomena, new scientific inventions and thereby scientific progress. The purpose of the adoption of concepts and conceptual viewpoints and the theoretical work in general is to produce new insights for introducing better conceptualisations for interpreting and explaining the phenomena. An example of this type of approach is Lyytinen and King's (2004) view of the IS field as "a market of ideas in which scholars (and practitioners) exchange their views regarding the design and management of information and associated technologies in organized human enterprise". A *core disciplinary field* aims at producing a unique identity, which it strives to protect against other scientific fields. It prefers a commonly shared, stable conceptual foundation, which is solid and coherent. Thus it has a limited and unique core, the concepts and theories of which it applies to any new research subject. The adoption of concepts and conceptual viewpoints that are seen characteristic of other scientific fields is strongly discouraged, unless the research is conducted under the label of the other discipline. An example of this type of approach is Benbasat and Zmud's (2002) proposal to restrict the subjects of IS research to the "IT artefact" and certain phenomena closely related to it. Also an *evolutionary field* aims at producing a unique identity, but without loosing fertility in potential cross-sections with other scientific fields. Concepts and conceptual viewpoints are eagerly adopted from other scientific fields if they add something essential to the existing core. The field has a commonly shared, incrementally evolving conceptual foundation and strives for making it solid and coherent. In times of rupture, existing concepts and conceptual viewpoints are modified and new ones are introduced into the foundation, which thereby looses some of its integrity. After this rupture, the field struggles to make the foundation solid and coherent again by looking for ways to integrate the new concepts and conceptual viewpoints to the conceptual core. This type of approaches attempt to combine the benefits of the other two approaches while at the same time avoiding their disadvantages. An example of this type of approach is Alter's (2003a) account of the core IS phenomena as "IT-reliant organisational systems".

Based on the *assumed boundaries of the scientific field*, the normative approaches can be classified in other two categories. A scientific field covers several research areas, each of which concentrates on a given specialty of the field. The former type of approach attempts to specify the core subjects of the field by *specifying its core research areas*. The research areas are selected according to a certain view of the field and the research subjects are then limited to those in the included research areas. For example, some may suggest that the IS core the area of Information Systems Development, while others may speak for a wider scale of research areas, including e.g. Computer Supported Co-operative Work, Knowledge Management, and Business Process Re-engineering. Any change in boundaries requires rethinking of the coverage of the field. The latter type of approaches attempt to specify the core subjects of the field by *specifying the core phenomena* that are studied in the field. The phenomena are selected according to a certain conception or conceptual viewpoint and the boundaries are then defined according to these phenomena. Any research area that focuses on these phenomena can be included in the field. The only criterion for including or excluding a research area is whether the area studies some core phenomena. Research areas that locate in a cross-section of scientific fields conduct interdisciplinary research and may be included in both or either field. In these approaches no research area is included in or excluded from a scientific field by definition but theoretical development in the area may lead to natural change. Because this type of approach is more open to change than the first one, there is less pressure for changing definitions in case the field evolves.

To speak of the unity of a scientific field does not necessarily require an attempt to define its contents and boundaries normatively. *Descriptive approaches* specify and classify field-specific concepts and theories on the basis of what teachers, researchers and professionals do in practice. They try to describe what is actually included in the conceptual foundation of the field based on empirical knowledge of current professional and scientific work. These approaches accept that there are and perhaps always will be conflicting conceptions about boundaries, relations with reference fields, underlying philosophy, and methodology of the field. Instead of normatively defined boundaries, the aim is to form a common understanding of the field's diverse and internally incongruent conceptual foundation. This background understanding would then enable the proponents of different schools to discuss and argue for and against various conceptions. The aim of this kind of approach is not necessarily a commonly agreed conceptual foundation but instead to help maintain and facilitate discourses between different schools. An example of such an approach is Bacon and Fitzgerald's (2001) systemic framework that specifies five main areas of IS research: Information; Systems Development, Acquisition and Support; People and Organisation; Operations and Network Management; and ICT. They identify the study of Information as the most characteristic one in the IS field although in practice it is dispersed in a number of research areas.

Common to all the above approaches is that they omit the role of language change in the progress of scientific fields. Whether exclusive or inclusive, they ultimately hold to existing languages.

3 EVOLUTION OF SCIENTIFIC LANGUAGE AS THE DRIVE FOR SCIENTIFIC PROBLEM SOLVING ACTIVITIES

> *If I am right, the central characteristic of scientific revolutions is that they alter the knowledge of nature that is intrinsic to the language itself and that is thus prior to anything quite describable as description or generalization, scientific or everyday. New scientific theories can only be formulated by altering the language with which nature is described. Violation or distortion of a previously unproblematic scientific language is the touchstone for revolutionary change.*
>
> *Thomas S. Kuhn: The Road since Structure*

The conceptual foundation of a scientific field may be solid and coherent, or it may bring in different, even contradictory viewpoints into professional and scientific problem solving activities in the field. It reflects the paradigms and paradigmatic orientations of the field. The concept of paradigm was launched by Thomas S. Kuhn originally in 1962, and elongated in 1970 (Kuhn 1996). In the years to

come, his ideas evolved and especially in the latest writings he began to emphasise the role of language in understanding scientific change (Kuhn 2000).

A *paradigm* is a collection of the most fundamental assumptions of a professional or scientific community. With it, the members of the community perceive phenomena and conduct their work in a similar manner. Paradigms are shared within a collective in both explicit and tacit forms of knowledge and for some time they reproduce the exemplary problems and solutions for the community. They include assumptions about field-related knowledge and how it is gained and about the nature of the observed reality. Values are the most profound part of paradigms and guide the choices made. The belief and value systems of a paradigm are deeply rooted in the body of knowledge shared in the community. They are maintained by a uniform education and professional initiation rites. As shared commitments to a particular way of thinking, instead of explicit rules, the mind set forwarded by a paradigm is taken as "natural". Students of a field simply "grow" to think according to the paradigm. Paradigms may be shared within or between scientific communities: scientific fields, research fields, or scientific schools.

In addition to or instead of a full-developed paradigm, there may also be contrasting paradigmatic orientations within a scientific field (Koskinen & Liimatainen & Berki & Jäkälä 2005). A *paradigmatic orientation* is an explicit or tacit research perspective that views a common research subject in a specific light. They resemble paradigms but they are not as established in education and therefore the field in general may be quite tolerant of various orientations. Although different orientations may forward conflicting belief and value systems, they are not necessarily perceived exclusive. A *paradigmatic assumption* is a fundamental assumption included in or directly based upon a paradigm or a paradigmatic orientation. Paradigmatic assumptions include fundamental assumptions, e.g., about the ontology, epistemology, methodology, and ethics (Iivari 1991), of professional or scientific work. A *paradigmatic framework* instead is a synthetic tool, with which researchers attempt to classify different theories and approaches (Iivari & Hirschheim & Klein 1998).

Professional and scientific practice is based on a specific conception of the basic type of concepts that are seen applicable for describing and explaining phenomena and the most essential types of problems or problematic situations that need to be studied in that field. What are good systems like? How can we gain good systems? What does it mean that a system is successful? The foundation of professional and scientific problem solving is a body of concepts that enable the professional or the researcher to discern a potential problem and to identify or to invent a potential solution for it. On the one hand, the identification of an issue as a problem is possible only from a certain conceptual viewpoint. With different concepts a problem is perceived differently. Or, an issue might not be perceived as a problem at all, or at least not as "our problem". On the other hand, also the identification or the invention of a potential solution for a perceived problem is possible only from a certain conceptual viewpoint. The chosen conceptual viewpoint determines what kind of answer could be accepted as the "solution" of the problem. Sometimes the identification of a problem and a solution need different viewpoints. This implies that both conceptual innovation in line with hermeneutic interpretation and critically conducted traditional theoretical analysis is required in this problem solving activity.

The purpose of professional and scientific concepts is thus to enable problem solving. Problem solving requires the identification, selection and definition of suitable concepts but also guides and drives it. In this way, the problem solving activity matures through conceptual development and evolution. Concepts and conceptual viewpoints are chosen in a way that "valid" answers are gained for chosen "valid" questions. These choices are ultimately paradigmatic, whether we recognise it or not. Concepts evolve with problem solutions when it is recognised that currently used concepts can not help solve a problematic situation or that some new concepts are better for solving it. For example, the problem of IS implementation has been understood differently e.g. as a technical IT problem, an organisational management problem, or a fully human problem. The latter ones have emerged in IS vocabulary only after it was recognized that the former ones are not enough for IS researchers to account for the general problem. It may also be recognised that a problematic situation under study can be viewed in

an entirely different fashion, and that an entirely new starting point is opened up for dealing with it. The more fundamental changes there are the more radical scientific change is involved.

As a fragmented field, Information Systems has produced no coherent and solid tradition for its problem solving activity. Therefore, it has no coherent and solid conceptual foundation or unified scientific language either. Instead, different disciplinary schools have developed different conceptual viewpoints and linguistic conventions for their own preferred purposes. This has yielded several problems. Is it even possible to conduct and maintain a meaningful discourse between researchers or practitioners with different conceptual and paradigmatic backgrounds? Are the commonly used terms such as “information”, “system”, and “information system” so charged with different meanings and connotations that they can not play their role as the central terms of the profession? Is there anything in common and how could we discern it? These are questions that need to be solved by the current and future IS community. A common paradigm in a scientific field emerges only if there emerges also a common and unified scientific language. Such a language is able to emerge only if scientific education in the community is unified, which means excluding any teaching of contra-paradigmatic viewpoints and belief systems. However, this is not feasible unless it is credibly demonstrated that the most essential problems of the field can be identified and solved with a current scientific language. This is not the case within the field of Information Systems. Although we need to be disciplined, being disciplined in a meaningless way does not help.

4 NARROWING DOWN A POTENTIAL IS CORE CONTEXT

The conceptual limits of IS research reflect the ontology of the field: what is believed existing and how it is believed to exist. This conceptual foundation is portrayed through a set of concepts and theories that form a conceptual viewpoint or a set of viewpoints for describing and explaining the “essential” IS phenomena. Information Systems has long been a complex and multi-perspective field and its concepts and theories have been developed in the cross-section of various reference disciplines (Avison & Nandhakumar 1995). IS phenomena have been approached from multiple perspectives and in multiple ways. This has yielded a complex, disintegrated and evolving set of basic concepts in IS research. Therefore it has been difficult or even futile to give a solid and coherent account of the conceptual foundation of the field. There are different understandings of the mere nature of the foundation, let alone proposals for how to set limits to core IS phenomena. The differences tend to be explained with exogenous reasons (e.g., organisational and political), while reflecting on potential endogenous reasons (e.g., linguistic and phenomenal) seems to be regarded somehow less important. Yet, perhaps IS phenomena themselves, in the many ways in which we define them, might explain why these problems occur?

In the following, I shall introduce and discuss a theoretical setting that narrows down a potential IS core context for the development of various IS-related ontological theories. Ontological theories construct conceptual frameworks of phenomena by identifying their different elements or factors and influential dependencies between these elements. A theoretical setting for an ontological theory portrays the core context in which the theory is developed. The basis of my proposal is the recognition that in order to identify the IS field in contrast to its reference disciplines most effectively, we ultimately have to look for phenomena that are most distant from the core of reference fields. This is necessary if we want to claim for a unique identity as a community. I propose that the major reference disciplines of the IS field are centred upon four cores: information technology, organisation and institution, human beings, and semiotics. These reappear continuously in the various accounts of IS research. I suggest, then, that the various interdependencies that appear between the four reference cores would be understood as the IS core context (see Figure 1). I propose that the phenomenon IS research is ultimately interested in can be abstracted as semiotic and systemic interaction. The proposition is explained in the following.

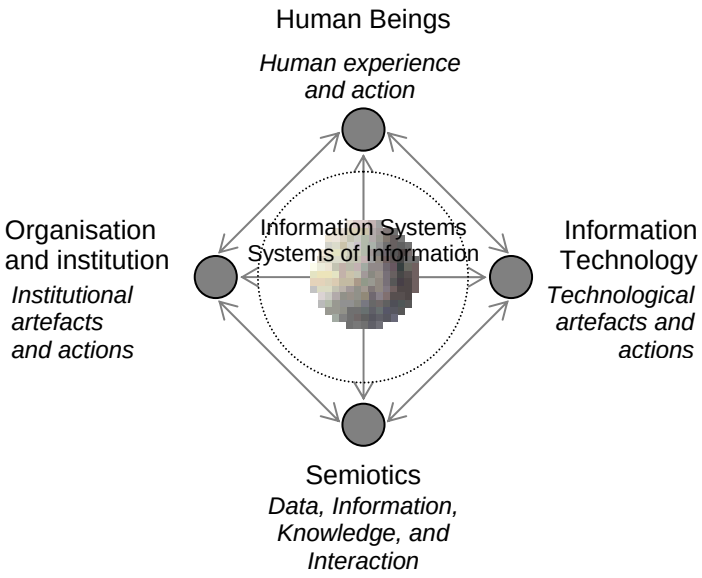

Figure 1. The proposed IS core context at the intersection of the major reference disciplines

IS research seems to be interested in phenomena that constitute of or intimately relate to *systemic interdependencies*. These systemic interdependencies seem to have *temporal manifestations that demonstrate themselves in actions*. For example, organisational structures are constructed and demonstrated through the actions taken by people in an organisation. My first conclusion therefore is that we have to look for the potential IS core at the systemic interdependencies between IT, organisation and institution, and human beings. Before we can do this, it is necessary to clarify how the three terms are used here to avoid certain potential misunderstandings. By *information technology (IT)* I mean "pure" information technologies, any brand of IT-reliant technologies, such as communication technologies, management technologies, and manufacturing technologies, and any brand of ubiquitous, embedded, or wearable IT applications. What is required of a proper brand of IT is that it contributes through artefacts and acts to the systemic interdependencies among technologies, organisation and human beings in a given setting. By *organisation and institution*, I mean the institutional artefacts and acts that attempt to organise, coordinate and legitimate certain social and personal behaviours and the diffusion and use of certain technologies at any sphere of personal, organisational or societal life. By *human beings*, I emphasise the fundamental human nature of people as thinking, knowing and emoting individuals and their various social and personal intentions and behaviours as they engage in various interdependencies with IT, organisation, and each other.

My second conclusion, therefore, is that the IS core context deals with what I shall call here *systemic interaction*. The term *systemic* is used here to convey that the interdependencies that we study can be viewed as complex "systems of interdependencies". It is important to notice that there are no real boundaries for systemic interaction between IT, organisation and institution, and human beings, and therefore any claim for a "system" is just another partial conceptualisation of systemic interaction. Furthermore, the use of the term systemic does not discriminate any type of systemic characteristics, such as deterministic, contingent, or emergent. The term *interaction* is used merely to convey that the interdependencies present in systemic interaction have such manifestations in time that have effect on and are affected by the elements between which they appear and other interdependencies. An inherent property of systemic interaction is that it is able to reflect and change itself and that it continuously reproduces itself upon its history.

However, there are a wide range of disciplinary fields that are interested in the interdependencies between IT, organisation, and human beings. The view is still too wide. Systemic interaction studied in IS relies heavily on the creation, use and mediation of data, information, and knowledge between human beings who use language and various technological and institutional artefacts and acts as its

media. My third conclusion is therefore that the IS core context covers such systemic interaction between IT, organisation and human beings, the nature of which is fundamentally semiotic. The suggestion that the nature of the systemic interaction is semiotic conveys the key role of data, information, and knowledge and the relevance of symbolisms and language in mediating them. This *semiotic interaction* penetrates the personal, social, institutional and technological spheres of IS phenomena. Combining the semiotic with the systemic is needed to guide IS research to focus towards the semiotic aspects of systemic interaction ("information systems") and the systemic aspects of semiotic interaction ("systems of information"). I suggest that any relevant IS research concerns, in one way or another, some aspect of such systemic interaction.

There cannot be but artificial boundaries for a field that studies systemic interaction. My proposal does not promote a specific ontological theory of IS phenomena but rather identifies a sphere of influence in which IS research has the potential to be the strongest among its reference fields. This systemic interaction can be examined in various contexts, such as management or technology. In each context, IS researchers reconstruct a specific viewpoint that emphasises unique aspects of the interaction. I see varying ontological specifications of the IS core in fact as attempts to conceptualise the systemic interaction from different viewpoints. This reference to viewpoints makes them more appropriate for specifying various research subjects. It is natural that any attempt to promote a single viewpoint as the very core of the whole field confronts fierce objection from other researchers. No conceptual foundation proposed for the IS field can rely on a single viewpoint. Systemic interaction can be, and ultimately must be, interpreted and explained from the viewpoint of each interacting element as well as from the viewpoint of different interdependencies within the interaction.

5 IMPLICATIONS ON INFORMATION SYSTEMS RESEARCH

The above four factors produce four partially contradictory conceptual viewpoints to studying IS phenomena: organisational, technological, human, and semiotic (Figure 2). Each viewpoint brings forth and focuses on its own central questions, in which the other factors act as a kind of "horizon". Those viewpoints that are omitted from a piece of research may seem inessential and even insignificant. However, if one studies the subject from another viewpoint, these factors and issues may become most essential and significant. Each viewpoint emphasises the four factors differently.

- The *organisational viewpoint* emphasises the management of various organisational activities and structures, economical feasibility, productivity and efficiency of performing tasks. Organisation is viewed as the structural and normative background for organisational activities, or as an abstract actor performing organisational missions. Technology forms the resources and tools for organisational activities. The human being is an organisational actor – the source of "human factors" in systems. Semiotically, the core subject is information needed in organisational activities, and its efficient production and sharing among organisational actors and tasks.
- The *technological viewpoint* focuses on the technological aspects of information systems. Its objective is the technological efficiency and reliability of systems. Organisation is understood as the provider and maintainer of the technological infrastructure and technological solutions. The human being is the "user behind the user interface" – a source of requirements and problems. Semiotically, the viewpoint focuses on the technological media for processing, storing and transferring data.
- The *human viewpoint* studies the relationship and interaction between the human being and the information system at various levels. Organisation is a product of active human behaviour, and technology is subject to a variety of human needs and requirements. The human being is a holistically viewed person – a knowing, emoting, and experiencing subject. Semiotically, the core subject is human knowledge and human interpretation of personal and social activities, organisation and technology.
- The *semiotic viewpoint* studies information systems as technological, organisational, and human communication systems. It aims at clarifying the various symbolic and linguistic roles that

information systems take. Organisation is viewed as the environment for linguistic activities and discourses. Technology is the material carrier for messages and data. The human being is the interpreter of activities, organisation and technology. Human beings create, communicate, and share data, information, and knowledge in and between socially organised communities.

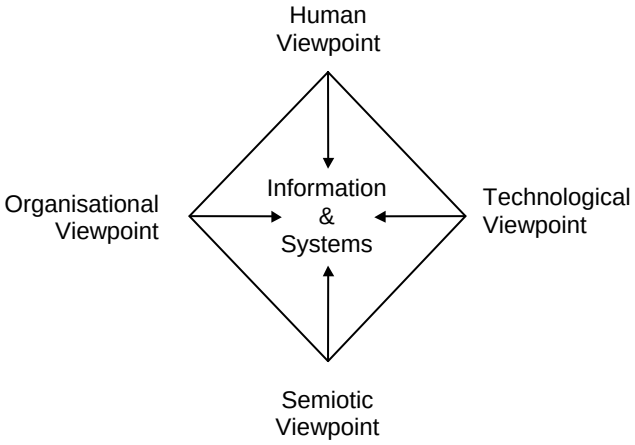

Figure 2. The core viewpoints in IS research

The above viewpoints are not enough to explain the variation exhibited in IS research. We need to take into account the *role of change* in systemic interaction. In fact, change is influential in most types of IS research, for example

- as the object of study, as in organisational IS implementation, and IS evolution and maintenance,
- as the purpose and goal of the object of study, as in software engineering, IS development, and IS training,
- as a factor necessitating the object of study, as in IS strategy and alignment, and IS management, and
- as a factor influencing or being influenced by the object of study, as in IS performance, customer relations, and user acceptance.

A shared language about systemic interactions and the role of change would first and foremost require that we are able to discuss change at a level that makes current paradigmatic differences visible. The role of change in the systemic interactions is important in highlighting paradigmatic problems and differences in research approaches. For example, a major "anomaly" in the IS field is that, despite all efforts in IS research, the practical results from IS projects that produce changes in the systemic interaction are still not what intended. There are several fundamental questions that we should ask: To what degree the change can be effectively designed in order to achieve the intended results? To what degree IS change is truly intentional and manageable? The study on systemic interactions should answer these questions. Further, what is the role of cultural sensitivity (cf. Hofstede 1991) in choosing e.g. engineering, design, or action research approach as the catalyst of change?

In the light of the above discussion, the amount of "peripheral" IS research seems less abundant. The most peripheral IS research is likely to appear close to the core of a reference discipline. For example, the use of specialised systems in a specific application domain, such as marketing systems in marketing, without some more widely usable findings or insights for their development or system usage in general seems quite a peripheral subject of study and could be left to the (potentially) much more qualified professionals of that domain. But we need to be cautious when generalising from considerations such as this, since a large part of IS research is genuinely interdisciplinary. Studies that seem peripheral from an opposite strand of IS, such as the humanisation of IS from the viewpoint of technologists (Isomäki 2002), may be very influential to the study of systemic interaction. In short, any study is to yield a contribution to IS research if it can provide something to enhance our

knowledge of semiotic and systemic interaction between IT, organisation, and human beings, issues related to its change, or its practical applications.

There are certain consequences of my proposition of the IS core context, which I wish to elaborate here. Firstly, having defined the IS core in the above way, one of my aims has been not to unduly discriminate any potential viewpoint that might shed light on IS phenomena. Although my proposition is undeniably and necessarily a viewpoint itself, it is intended to reach beyond the various research viewpoints. This intention applies also to the motivations that "legitimate" the development, management and utilisation of any "systems". As an academic discipline, the IS field has to reach beyond the specific motivations that arise in the various professions that deploy the knowledge resulting from its activities. There is room and need for research that contributes to the theoretical knowledge of semiotic and systemic interaction and for applied research that contributes to the practical knowledge of information systems and systems of information. Furthermore, there is room for research that contributes to the exchange of knowledge between the IS field and its reference disciplines. I am convinced that all three types of research fully merit to be called 'IS research'.

Another consequence of my proposition is that it will ultimately require a step away from "common-sense" or "practitioner" vocabularies into more abstract field-specific theories and concepts. In this I specifically object and contradict the tenet stated by Alter (1999) that a "theory should be expressed in terms of words most business and IT professionals understand". This would be as feasible as to necessitate the various theories of Physics to be expressed in terms used by laymen. If we are to go beyond the mere surface of IS phenomena, we cannot truly expect that we can explain and understand them in mere layman terms. At least we need to radically redefine the terms, which I do not believe to suffice in the long run. As in other fields, we have to focus on educating our practitioners and delivering applications and popularisations of our abstract theories to the degree we shall have them.

The above discussion has implications to the problem solving activity in IS research and practice. Firstly, all the four viewpoints have to be taken into account in any holistic piece of research on IS phenomena, since they cannot be fully understood only from one or two viewpoints. Secondly, it is unlikely that those viewpoints yield together a non-conflicting whole. It would be a mistake to expect a holistic theory that would represent a harmonic view of IS phenomena. A model of an internally conflicting reality cannot avoid internally conflicting viewpoints. Yet, this does not mean logical contradiction. Instead, it is important for us to identify the harmonies and conflicts that appear in the real world whether we perceive the world "objective", "intersubjective" or "subjective", and physically or socially constructed. Therefore, thirdly, there is a need for the integration of different viewpoints in the sense that we should identify what conflicts there are and where they appear. This integration cannot be made using only the existing scientific languages and dialects currently used in the IS field. They are not useful for the purpose, since they do not support a fair account of the existing conflicts. I find this as the major shortcoming for example in the FRISCO approach (IFIP 1998) that aims to develop a common vocabulary in the IS field. We need to change our scientific languages to convey and bridge gaps between different viewpoints and schools. Thereby, new conceptual innovations and active reinterpretation of used theories are needed.

6 CONCLUSIONS

My general aim has been to explain the diversity apparent in the IS field as a consequence of the varying views taken to the systemic interaction between technology, organisation and institution, and human beings. As this fragmentation concerns merely the viewpoints taken, there is no need to understand the diversity as a threat against the unity of the field. For time to time, IS researchers need to justify the existence of the field in contrast to its reference disciplines, which generates a process that is likely to lead the IS community towards the proposed core context. As the reference disciplines will look for more and more sphere of influence in regard to IT related research, the best stronghold is to be found therein. The IS community is the strongest candidate to claim for this core context due to two facts. Firstly, it is the sphere of IT-related phenomena in which the field already has the strongest

body of knowledge among its reference disciplines. Secondly, it is the most peripheral sphere from the viewpoint of the reference disciplines, which therefore are and will be much weaker to make any claims for it.

There are no clear boundaries between different disciplinary fields today and claims are frequently made for phenomena studied in other fields. This will not change in the future. A disciplinary field that reconstructs its identity as a field studying the "IT artefact" or the "IT-reliant organisational system" would be severely threatened as the very sphere of living in our societies is becoming ever more "IT-reliant". The consequences can be seen in current interdisciplinary research efforts on the use and effects of IT. These efforts may bypass IS departments simply because the academics in the reference fields are not aware of the relevant research that has been carried out for years or even decades in our field.

It is important for us as IS researchers to understand that the criticism one may face from other academic institutions tends to be "viewpoint biased". For example, business schools are biased towards management. If IS researchers working in business schools advertise themselves having the same single viewpoint, the same motivations, and even the same scientific and professional languages as researchers in other business departments, they have no means to indicate their uniqueness in the long run. If one takes a management viewpoint and ignores all others, then one cannot avoid the conclusion that this research is management research. It can be IS research only if it is related to the general study of semiotic and systemic interaction between IT, organisation, and human beings (or whatever we decide to call it). This applies to any viewpoint taken in IS research.

An attempt to specify core ontology should not entail that we make an artificial decision to exclude a part of our "natural population", or that we would artificially cling to some specific conceptual choices for the years to come. Neither of these are proper methods on an intellectual voyage. Yet we need to understand where we are now as a research community, and each researcher needs to understand one's role in forwarding this community on its voyage. An inclusive view of the ontology of the field and willingness to actively pursue to evolve one's language, concepts, and conceptual viewpoints critically but innovatively in research is essential for this.

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